

REMARKS/ARGUMENTS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-19 are presently pending in this application, Claims 10-19 having been withdrawn from further consideration by the Examiner, Claim 1 having been amended by the present amendment.

In the outstanding Office Action, Claims 1-4 were rejected under 35 U.S.C. §102(a) as being anticipated by Eda et al. (U.S. Patent 5,747,857); and Claims 5-9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Eda et al.

Claim 1 has been amended herein. This amendment is believed to find support in the original specification, claims and drawings, for example, page 10, lines 2-5, and page 21, lines 6-12, of the specification and Figures 4 and 5. Hence, no new matter is believed to be added thereby.

Briefly recapitulating, Claim 1 of the present invention as currently amended is directed to a crystal unit including a crystal blank for a vibrator, and a reinforcing plate comprising a quartz crystal plate or a glass plate and having a through-hole, wherein the crystal blank and reinforcing plate are joined at an entire peripheral portion of the crystal blank by direct bonding. By providing such a reinforcing plate, no stress is applied to the crystal blank upon the change of ambient temperature since the thermal expansion coefficient of the reinforcement plate is substantially equal to that of the quartz crystal blank, thereby effectively maintaining the resonant frequency of the quartz crystal blank constant. Furthermore, because the entire peripheral portion of the crystal blank of, for example, AT-cut, is directly bonded to the reinforcement plate comprising a quartz crystal

plate or a glass plate, the mechanical strength of the crystal unit is significantly improved and the mass production of the crystal units can be facilitated more efficiently.¹

Eda et al. disclose electronic components having high frequency elements.

Nevertheless, Eda et al. are not believed to teach “a reinforcing plate comprising a quartz crystal plate or a glass plate and having a through-hole, wherein said crystal blank and said reinforcing plate are joined at an entire peripheral portion of said crystal blank by direct bonding” as recited in amended Claim 1. On the other hand, Eda et al. mainly disclose a quartz crystal piezoelectric member bonded to a silicon (Si) or GaAs semiconductor substrate. Since the thermal expansion coefficients of Si and GaAs substrates are different from that of quartz crystal, a stress is applied to the quartz crystal piezoelectric member in the Eda et al. device when the ambient temperature is changed, and consequently, the resonant frequency of the Eda et al. quartz crystal piezoelectric member changes. Furthermore, Eda et al. are not believed to disclose that all the peripheral portion of the quartz crystal blank be directly bonded to the reinforcement member made of the quartz crystal plate or glass plate. Examples 36 to 42 in Eda et al. disclose a quartz substrate which is directly bonded to a holding member made of quartz crystal at only one end of the quartz substrate. In other words, the quartz substrate is held by the holding member in a single-beam manner. Examples 43 and 44 in Eda et al. disclose a rectangular quartz substrate which is directly bonded to a glass substrate for holding the quartz substrate, but as shown in FIGS. 37 to 57 of Eda et al., the quartz substrate is bonded to the glass substrate at only three sides of the quartz substrate. Therefore, Eda et al. are not believed to disclose the entire peripheral portion of a crystal blank being directly bonded to the reinforcement member. Based on the above discussions, the

¹ See, for example, Specification, page 5, line 23, to page 8, line 12.

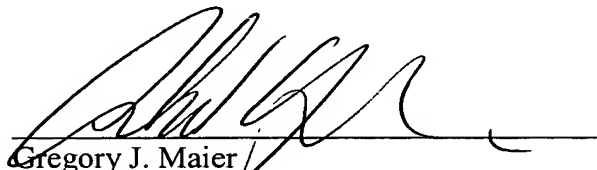
structure recited in amended Claim 1 is believed to be distinguishable from Eda et al. and because Eda et al. do not disclose the reinforcing plate as recited in amended Claim 1, the crystal unit recited in Claim 1 is not anticipated nor rendered obvious thereby.

For the foregoing reasons, Claim 1 is believed to be allowable. Furthermore, since Claims 2-9 ultimately depend from Claim 1, substantially the same arguments set forth above also apply to these dependent claims. Hence, Claims 2-9 are believed to be allowable as well.

In view of the amendments and discussions presented above, Applicants respectfully submit that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599

Customer Number

22850

Tel: (703) 413-3000

Fax: (703) 413 -2220

(OSMMN 08/03)

Akihiro Yamazaki
Registration No. 46,155

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